

We claim:

1. One or more computer-readable media comprising computer-executable instructions for performing a method to calculate concentration of a substance in a test sample, the method comprising:
  - 5 for at least one observation of a metric for the test sample, finding where on a usable portion of a standard sigmoid curve the observation lies, wherein the usable portion of the standard sigmoid curve is determined via a second derivative of the standard sigmoid curve; and based on a location of the observation on the standard sigmoid curve, calculating a concentration of the substance.
- 10 2. The one or more computer-readable media of claim 1 wherein the sigmoid curve is represented via a four-parameter formula.
- 15 3. The one or more computer-readable media of claim 1 wherein the standard sigmoid curve represents a sigmoid curve fit to a plurality of observations taken of a reference sample having a known concentration of the substance.
4. The one or more computer-readable media of claim 1 further comprising computer-executable instructions for performing the following:
  - 20 determining for at least one observation of a metric for the test sample whether the observation is above a threshold value, wherein the threshold value is determined via a first derivative of the standard sigmoid curve; and indicating whether the observation is above the threshold value.
- 25 5. The one or more computer-readable media of claim 1 wherein: the observation indicates optical density for the test sample.
6. The one or more computer-readable media of claim 5 wherein: the concentration indicates an amount of antibody in the test sample.
- 30 7. The one or more computer-readable media of claim 6 wherein: the concentration indicates an amount of anti-PA IgG in the test sample.
8. One or more computer-readable media comprising computer-executable instructions for performing a method to calculate concentration of a substance in a test sample, the method comprising:
  - 35 for a plurality of observations of a metric for the test sample, fitting a test sigmoid curve to the observations; and

calculating a concentration of the substance in the test sample via the test sigmoid curve and a usable portion of a standard curve, wherein the usable portion of the standard sigmoid curve is determined via a second derivative of the standard sigmoid curve.

5           9.       The one or more computer-readable media of claim 8 further comprising computer-executable instructions for performing the following:  
indicating the concentration of the substance.

10          10.      The one or more computer-readable media of claim 8 further comprising computer-executable instructions for performing the following:  
displaying the concentration of the substance.

15          11.      One or more computer-readable media comprising computer-executable instructions for performing a method to calculate concentration of a substance in a test sample, the method comprising:

finding a usable portion of a sigmoid curve, wherein the usable portion of the sigmoid curve is determined via a second derivative of the sigmoid curve; and  
calculating a concentration of the substance in the test sample via the usable portion of the sigmoid curve.

20          12.      One or more computer-readable media comprising computer-executable instructions for performing a method comprising:

for a plurality of dilutions of a test sample, receiving respective measurements of optical density indicating concentration of live cells within the dilutions;

25          via the measurements, calculating a concentration of anti-PA IgG for the test sample via a usable portion of a sigmoid curve representing concentrations of live cells within dilutions of a reference sample having a known quantity of anti-PA IgG, wherein the sigmoid curve is represented via a four-parameter logistic technique, and wherein a usable portion of the sigmoid curve is determined via a second derivative of the sigmoid curve; and

30          indicating the concentration of anti-PA IgG for the test sample.

13.        A computer-implemented method of calculating concentration of a substance in a test sample having an unknown concentration of the substance, the method comprising:

determining a usable portion of a sigmoid curve fit to data points representing observations of a reference sample having a known concentration of the substance; and  
calculating the concentration of the substance in the test sample based on a subset of observations of the test sample, wherein the subset is associated with the usable portion of the sigmoid curve.

14. The method of claim 13 further comprising:

excluding at least one excluded observation of the test sample responsive to determining the excluded observation is outside the usable portion of the sigmoid curve.

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15. The method of claim 13 wherein determining a usable portion of the sigmoid curve comprises calculating a second derivative for the sigmoid curve.

16. The method of claim 13 wherein determining a usable portion of the sigmoid curve  
10 comprises designating a portion between a minimum and a maximum of a second derivative for the sigmoid curve as the usable portion of the sigmoid curve.

17. The method of claim 13 wherein a point on the sigmoid curve relating to a  
threshold for a first derivative of the sigmoid curve is used as a lower threshold to indicate presence  
15 of the substance.

18. A computer-implemented method of determining the concentration of antibody in a blood serum sample, the method comprising:

receiving a measurement of concentration of live cells in a test sample, wherein the test  
20 sample is generated by adding the serum to cells and a toxin neutralized by the antibody;  
determining whether the concentration of live cells falls within a usable portion of a standard sigmoid curve representing observations taken of a sample having a known concentration of antibody; and  
responsive to determining the concentration of live cells falls within the usable portion,  
25 calculating a concentration via the standard sigmoid curve.

19. One or more computer-readable media having computer-executable instructions for performing the method of claim 18.

30 20. The method of claim 18 wherein results for plural test samples for plural dilutions of an original test sample are included in the calculating.

21. The method of claim 18 wherein concentration of live cells is indicated by optical density of the test sample.

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22. The method of claim 18 wherein concentration of live cells is indicated by optical density of the test sample.

23. The method of claim 18 wherein the antibody is anti-PA IgG.
24. The method of claim 18 further comprising:  
discarding at least one observation having a concentration of live cells outside the usable  
5 portion of the standard sigmoid curve.
25. The method of claim 18 further comprising:  
in software, determining the usable portion of the sigmoid curve via a second derivative of  
the sigmoid curve.
- 10 26. A software system encoded on one or more computer-readable media, the software  
system comprising:  
a representation of a characteristic sigmoid curve;  
means for designating the usable portion of the characteristic sigmoid curve;  
15 means for receiving at least one observation of a test sample;  
means for determining whether the observation of the test sample is within the usable  
portion of the characteristic sigmoid curve; and  
means for calculating a concentration for the observation responsive to determining that the  
observation is within the usable portion of the characteristic sigmoid curve.
- 20 27. The software system of claim 26 wherein the usable portion of the characteristic  
curve is calculated via a second derivative of the sigmoid curve.
- 25 28. The software system of claim 26 further comprising:  
means for determining the usable portion of the sigmoid curve via a second derivative of the  
sigmoid curve.
29. The software system of claim 26 further comprising:  
means for rejecting an observation responsive to determining that the observation is outside  
30 the usable portion of the characteristic sigmoid curve.

30. One or more computer-readable media comprising computer-executable instructions for performing a method to indicate presence of a substance in a test sample, the method comprising:

- for at least one observation of a metric for the test sample, determining whether the
- 5 observation is higher than a threshold value, wherein the threshold value is determined via a first derivative of a standard sigmoid curve; and
- responsive to determining the observation is higher than the threshold value, indicating presence of the substance.